

# NASA SBIR/STTR Technologies

S1.07-9520 - eVADE: Volcanic Ash Detection Raman LIDAR



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## Identification and Significance of Innovation

Volcanic ash is a significant hazard to aircraft engine and electronics and has caused damage to unwary aircraft and disrupted air travel for thousands of travelers, costing millions of dollars. Michigan Aerospace Corporation (MAC) proposes to demonstrate the concept feasibility of a Raman Light Detection and Ranging (LIDAR) system to obtain real-time information from volcanic ash clouds, to be named EVADE (Volcanic Ash DETection Raman LIDAR).

The instrumentation will also be suitable for atmospheric dust transport measurements. Atmospheric dust plays a significant role in climate modeling; unlike volcanic ash that reflects the solar heating back into the upper atmosphere, dust absorbs the heat locally and causes heating of the troposphere.

The instrument will be designed to operate from an airborne platform, manned or unmanned, and as such, will be compact and lightweight.

Estimated TRL at beginning and end of contract: ( Begin: 3 End: 4 )

## Technical Objectives and Work Plan

The technical objectives are designed to answer the following questions and issues:

Technical Objectives:

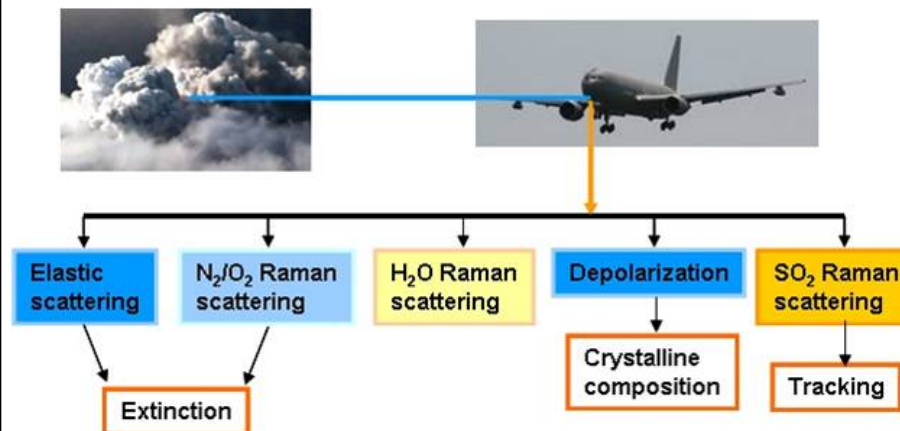
--1. Instrument prototype modeling and design (What are the optimal functional characteristics of the instrument? What optimization can be performed to enhance the performance?)

--2. Testing (Can the instrument's projected performance be verified using existing instruments at MAC?)

--3. Algorithm development (What modifications to MAC's existing algorithms can be performed to extract the maximum information from the data collected? Implementation of algorithm modifications and verifications.)

Work Plan:

- 1. Requirements Definition
- 2. Instrument Modeling and Design
- 3. Preliminary Tests
- 4. Algorithm Development
- 5. Program Management



## NASA Applications

An airborne volcanic ash detection/characterization system, such as EVADE, will have wide applications in the study of the threat volcanic ash poses to aircraft and for other scientific study of volcanic plumes. Studies carried out with EVADE will allow NASA to refine their models of volcanic ash dispersion based on more data than is available at present. There is potential to combine EVADE with MAC's optical air data system & icing and turbulence-detection systems into one single sensor suite.

## Non-NASA Applications

Other civil (NOAA, FAA, etc.) and military (US Air Force, etc.) organizations will have similar uses for this technology as NASA for scientific study. They also will be able to use EVADE as a sensor to determine if a given airway is safe enough for civil or military aircraft to use during an eruption, allowing commercial and military aviation to continue and be re-routed as necessary.

## Firm Contacts

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NON-PROPRIETARY DATA